IMPLEMENTATION PROS AND CONS BETWEEN ASYNCHRONOUS TRANSFER MODE (ATM) AND GIGABIT ETHERNET (GbE)

A thesis submitted to the Graduate School in partial fulfillment of the requirements for the degree Master of Science (Information Technology), Universiti Utara Malaysia

by
Baskaran Bendaiya

Sekolah Siswazah
(Graduate School)
Universiti Utara Malaysia

PERAKUAN KERJA TESIS
(Certification Of Thesis Work)

Kami, yang bertandatangan di bawah, memperakukan bahawa
We, the undersigned, certify that
Baskaran A/L Bendaiya
(nama penuh / *full name*)

calon untuk ijazah
candidate for the degree of **Master of Science in Information Technology**
telah mengemukakan tesisnya yang bertajuk
has presented his / her thesis with t he following title :

IMPLEMENTATION PROS AND CONS BETWEEN ASYNCHRONOUS TRANSFER MODE (ATM) AND GIGABIT ETHERNET (GbE)

(seperti yang tercatat di muka surat tajuk dan kulit tesis)
as it appears on the title page and front cover of thesis

dan tesis tersebut bole diterima dari segi bentuk serta kandungan, dan meliputi bidang ilmu dengan memuaskan.
The thesis is acceptable in form and content, and that a satisfactory knowledge of the field is covered.

AJK Tesis / *Thesis Committee*

(i) Nama / *Name*: HELMI MOHAMED HUSSAINI (Penyelia Utama / *Principal Supervisor*) Tandatangan *Signature* : Helmi Hussain

(ii) Nama / *Name*: _____ Tandatangan *Signature* : _____

(iii) Nama / *Name*: _____ Tandatangan *Signature* : _____

Tarikh / *Date* : 11/6/2000

PERMISSION TO USE

In presenting this thesis in partial fulfillment of the requirements for a post graduate degree from Universiti Utara Malaysia, I agree that the University Library may make it freely available for inspection. I further agree that permission for copying of this thesis in any manner, in whole or in part, for scholarly purposes may be granted by my supervisor or, in their absence, by the Dean of the Graduate School. It is understood that any copying or publication or use of this thesis or parts thereof for financial gain shall not be allowed without my written permission. It is also understood that due recognition shall be given to me and to Universiti Utara Malaysia for any scholarly use which may be made of any material from my thesis.

Requests for permission to copy or to make other use of materials in this thesis, in whole or in part, should be addressed to :

Dean of Graduate School
Universiti Utara Manlaysia
06010 UUM Sintok
Kedah Darul Aman

Abstrak

Peningkatan permintaan terhadap keupayaan menghantar data melalui peningkatan bilangan pengguna dan penggunaan applikasi intranet dan multimedia menyebabkan rangkaian komputer masa kini tidak dapat berfungsi dengan cekap. Di antara teknologi rangkaian yang cuba memenuhi permintaaan diatas ialah Asynchronous Transfer Mode (ATM) dan Gigabit Ethernet (GbE). Teknologi tersebut bersaing hebat untuk mendominasi pasaran teknologi rangkaian.

Teknologi Gigabit Ethernet direkabentuk bertujuan mengutamakan prestasi dan perkembangan rangkaian. Ia akan diimplimentasikan di rangkaian setempat berbagai saiz. Teknologi tersebut akan membolehkan peningkatan drastik dalam keupayaan pencapaian pengguna terhadap applikasi rangkaian. Apabila rangkaian komputer dinaikkan taraf kepada keupayaan menghantar data sebanyak gigabit, membolehkan rangkaian tersebut memberi perkhidmatan kepada ramai pengguna tanpa penurunan prestasi.

Kelebihan ATM ialah kepantasan dan fleksibilitinya. ATM membolehkan rangkaian komputer menghantar dan menerima sebanyak gigabit dalam satu saat. Kelebihan ATM ialah teknologi tersebut membolehkan pengguna transmit maklumat VIViD hanya melalui satu medium. Satu lagi kelebihannya ialah bandwidth diberikan semasa transmisi berlaku sehingga trasmisi tersebut tamat membolehkan ATM dapat menyokong sebarang applikasi.

Kenyataannya ATM dan Gigabit Ethernet bukan suatu teknologi yang boleh saling digantikan dengan satu sama lain. Setiap teknologi mempunyai kelebihan masing-masing dan hanya mampu menyokong appiikasi tertentu sahaja. Contohnya, Gigabit Ethernet akan digunakan dalam rangkaian komputer yang kini menggunakan Fast Ethernet dan FDDI yang tidak mampu menyokong bandwidth yang diperlukan untuk transmisi data. Dalam perkataan lain, Gigabit Ethernet hanya diimpiimentasikan dalam rangkaian komputer

yang memerlukan keupayaan bandwidth yang besar tetapi tidak mengutamakan kualiti servis.

ATM pula akan digunakan dalam persekitaran yang mengutamakan kepantasan dan ketepatan penghantaran seperti video, suara dan sebagainya. Applikasi-applikasi ATM mula diimplimentasikan dalam persekitaran rangkaian luas (WAN). Keadaan ini mungkin mmbolehkan rangkaian komputer menggunakan ATM dalam rangkaian setempat (LAN) dan rangkaian luas (WAN) atau mungkin menggunakan Gigabit Ethernet untuk menghantar trafik rangkaian setempat dan ATM menghantar trafik rangkaian luas.

Abstract

Growing demands for bandwidth spurred by increasing numbers of users and data-intensive office, intranet and multimedia applications are adding a significant burden to backbones in many of today's networks. Several technologies have emerged to meet these demands. The two dominant technologies competing for dominance in the network backbone are Asynchronous Transfer Mode (ATM) and Gigabit Ethernet (GbE)

Designed to offer higher performance and scalability, Gigabit Ethernet will be implemented in general-purpose LANs of all sizes. The technology will provide dramatic increases in the bandwidth available for users to access servers and applications. When a backbone is upgraded to gigabit throughput, a network can support a marked increase in the numbers of segments and nodes it supports without degrading performance.

It's a bi-directional, full-duplex switched technology. The greatest advantages of ATM are its speed and flexibility. ATM boasts gigabit-per-second transfer rates. However with the growing speed of other protocols, ATM's biggest selling point is that it can transport all VIViD information over a single-medium. Another feature is that bandwidth is provided on the fly, providing enough to support any given application and is only assigned until transmission is complete. No single user can monopolize an ATM channel.

In reality, ATM and Gigabit Ethernet are not equal substitutes for each other and should not be considered as such. Each technology is appropriate for specific applications. Simply stated, Gigabit Ethernet will be deployed in areas where Fast Ethernet and other technologies like FDDI are no longer able to provide the bandwidth needed for pure data traffic. In other words, Gigabit Ethernet will be used in areas where high data throughput is required, but quality of service is not a main concern. ATM will be used in environments where video, voice and other delay sensitive traffic exist. Some applications for ATM are also starting to be implemented in the WAN.

This could lead to networks that use ATM in the LAN and WAN, or possibly networks that use Gigabit Ethernet to carry LAN traffic and ATM to carry WAN traffic.

Table of Contents

CHAPTER FOUR : ATM IMPLEMENTATION

CHAPTER FIVE : GbE IMPLEMENTATION

CHAPTER SIX : ATM vs GbE

List of Tables :-

List of Figures :-

Chapter 1

Introduction

1.1 Today's requirements of computer networks

Technology alter the office environments so quickly that it's easy to lose sight of explosive changes in the way people work that have taken place over the past decade. The leader of a typewriter industry that had penetrated virtually every office by 1980 saw its sales evaporate as customers shifted to stand-alone personal computers (PCs) with word processing programs and printers. By the mid 1980s, many companies had begun linking together PCs to form networks in order to share equipment and programs.

Communication networks tend to grow over time, both in number of users and in required bandwidth per user. For this reason networks have to provide an increasing amount of total bandwidth. Also new types of applications are being developed and come into use, requiring the network to provide different types of service than before. Multi media type applications are an example of this. These applications need to transport streams of audio and video over the network, with particular real-time and loss requirements. Current computer networks were originally not designed to cope with these kinds of requirements.

The 1990s have seen a proliferation of networks found at a single location (Local Area Networks (LAN)) as well as the growth of Wide Area Networks (WAN) that link corporate networks at several locations regionally, nationally or even globally. Many companies are now planning to adopt a new technology known as Asynchronous Transfer Mode (ATM) and Gigabit Ethernet (GbE) among other technologies such as Fiber Distributed Data Interface (FDDI), Copper Distributed Data Interface (CDDI), Fast Ethernet, Asymmetric Digital Subscribers Line (ADSL) and Cable Modems.

The contents of the thesis is for internal user only

Chapter 8

References

Books :-

Bob Klessig, "Integrating ATM Across the Enterprise Data Network", 1998
3Com

C. Partridge, "Gigabit Networking", 1993
Addison-Wesley, USA

David, Axner, "Gigabit Ethernet : A Technical Assessment",
Telecommunications, March 1997, pp 31 – 34

Dr John McQuillan, November 2, 1999, "NGN 99 : Where the Net is Going Next", ATM News Digest

Gabriel Allan, "The Gigabit Ethernet Opportunity", Network Digest,
Volume One, Number Two, May 1997, Newton, Mass.

Gigabit Ethernet Alliance, "Gigabit Ethernet White Paper", Aug 1996,
Cupertino, California

IEEE Draft P802.3z/D3 "Media Access Control (MAC) Parameters,
Physical Layer, Repeater and Management Parameters for 100 Mbps Operation", June 1997

Jato Technologies, "Why Gigabit Ethernet ?", January 1997,
Austin, USA,

Jonathan C K Cheng, : "Application of ATM in LANs", October 1996,
Queensland University of Technology, Brisbane, Australia.

Kyas Othman, "ATM Networks", 1998
International Thomson Computer Press, USA

Martin P. Clark, "ATM Networks – Principles and Use", 1996
Wiley & Teubner, UK

Schatt, Stan "Understanding ATM", 1996
McGraw Hill, USA

Som Sidkar, Paul Bottorff and Bruce Tolley, November 2, 1999
"NGN 99 : 10 Gpbs, The Next Step in Ethernet Networking",
ATM News Digest

Sprenkels R. A. M., M Sc Thesis " Management of ATM Networks", June 1996, University of Twente, Netherlands

Stallings, William & Richard Van Slyke, "Business Data Communication." 1998, Macmillan College Publishing Company.